Legislature, but for reasons not explained, the medical authorities of the Army and Navy have never followed through with the establishment of a hospital on a mineral spring site. (For reference thereto, see CALIFORNIA AND WESTERN MEDICINE, March, 1943, on pages 105 and 137.)

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On the Value of Mineral Spring Therapy and Spa Regimen.—An article by Henry E. Sigerist of Johns Hopkins Medical School was referred to, and from it the following excerpts are given:

To the European physician who comes to America it is very striking to find what little use this country is making of its mineral springs. The situation is so totally different from that which prevails in Europe that it calls for an analysis. . . .

Medicinal springs and their curative powers are mentioned by ancient and mediaeval medical writers. . . .

The European spas have been used for over 2,000 years. Medical theories changed. . . .

But whatever the theories were, patients for over 2,000 years went to the spas, bathed in their waters, drank them and found relief. Every medical theory was used to explain the effect of medicinal waters. The explanations changed, but there were always results. In every century patients were benefited by their cures. . . .

It is very unscientific to deny the experience of 2,000 years merely because we have no ready-made theory that explains all phenomena in every detail. It would have been foolish to deny the existence of lightning because electricity was not yet known. Experience has preceded science in medicine more than once. Our most valuable drugs, quinine, digitalis, opium, mercury and many others were given for centuries, long before pharmacology was able to explain their action. Oskar Baudisch has very pertinently shown how similar the situation was with regard to heliotherapy. Sunlight was used as a healing agent for centuries. Rickets were treated with ultra-violet rays. To "scientific physicians" this was a mere superstition—until the vitamins were discovered and it was found that sunlight changes the ergosterol of the skin into vitamin D. Chemistry until recently was gross chemistry; microchemistry is in its infancy still, and we are beginning to realize that a few molecules of a chemical compound can cause definite biological reactions. . . .

* * *

Not Yet Too Late for Establishment of a Military Hospital on a California Mineral Spring Site.—If, in the future, additional military hospitals are to be established in California, it is to be hoped that one or more will be erected in a mineral spring area.

In years to come, when such institutions may have fulfilled their immediate and special needs, the grounds and buildings either could be given by the Federal Government to California, or purchased by the State, for maintenance of curative institutions such as Saratoga Springs, owned by the State of New York. In that wise, the money expended, would have doubly justified itself: first, in excellent and desirable hospitalization for many of our wounded soldiers and sailors; and secondly, in making possible in days ahead, promotion of institutional and accessory care to thousands of civilian citizens suffering from chronic conditions, for whom scientific spa regimen, under the California skies, would give better opportunities for reëstablishment of health and prolongation of life.

It is difficult to understand why the medical departments of the Army and Navy have not availed themselves of some of Nature's curative means, since institutions established on mineral spring sites can possess all the advantages of hospitals located elsewhere, with valuable curative elements in addition.

It will be interesting to note whether the new resolutions of the California Legislature will receive serious consideration by the Medical Authorities of the Armed Forces.

EDITORIAL COMMENT†

ANTIBIOTICS IN ONIONS AND GARLIC

In 1931 Tokin,[1] Kovalenok[2] and others of the Moscow Laboratory of Experimental Biology, became interested in the volatile antibiotics of certain higher plants, particularly active bacteriocidal vapors given off by raw onions, garlic, horseradish and related plants. Bacteria, fungi and protozoa exposed to these vapors were usually killed within 2 to 5 minutes. They found these vapors ("phytoncides") to be particularly active against staphylococci, streptococci, B. typhus and the tubercle bacillus.

Toroptsev[3] and his associates of the Biological Institute, Tomsk University, attempted to determine a possible clinical application for these volatile "phytoncides." Aseptic wounds on rabbits and white rats were exposed for repeated 5-minute periods to concentrated vapors from fresh onion or garlic paste. The volatile antibiotics had a marked stimulating effect on the rate of aseptic wound healing in these animals, both granulation and epithelialization being hastened. The vapors were then used in the treatment of experimental septic wounds. Wounds measuring 1 x 1 cm. were made on both sides of rabbits and the wound surfaces covered with rabbit pus containing streptococci, staphylococci or other pathogens. After inflammation had developed, the wound on one side of each animal was exposed for 15 minutes daily to raw onion or garlic vapor. The untreated control wounds on the same rabbits showed a progressively phlegmatous and necrotic process. There was a rapid sterilization and accelerated healing of all septic wounds exposed to the antibiotic vapors.

So encouraging were these results that phytoncide therapy was applied to the treatment in infected human wounds. Eleven sluggish amputation wounds were selected, seven of the arm, one of the thigh and three of the foot. Eight of the wounds were purulent and contained streptococci, staphylococci or other pathogenic bacteria. In two patients the amputation was complicated by gas gangrene, and one by frostbite. Examination of the extremities before phytonide therapy showed distinct purulent inflammation of all wounds, with marked edema and odor in most cases. Many of

† This department of CALIFORNIA AND WESTERN MEDICINE presents editorial comments by contributing members on items of medical progress, science and practice, and on topics from recent medical books or journals. An invitation is extended to all members of the California Medical Association to submit brief editorial discussions suitable for publication in this department. No presentation should be over five hundred words in length.

the patients complained of pain in the amputated area.

To apply vapor therapy, freshly prepared onion paste was placed in the bottom of a prepared dish, which was applied over the wound in such a way that the surface of the wound did not come in contact with the paste. The dish was held in place by layers of cotton. Exposure to the bactericidal vapor was usually performed daily in two 5-minute periods. For each period a freshly prepared paste of one onion was used. After the first vaporization all wounds without exception became rose-colored instead of gray, and the patients no longer complained of pain. Purulence subsided and the odor disappeared soon after the second treatment. By the fifth treatment all patients showed extensive granulation and epithelialization. This was followed by complete and uneventful healing in most cases.

In addition to these volatile bactericidal substances the presence of clinically promising non-volatile antibiotics in onions, garlic and rhubarb has been recently shown by Huddleson[4] and his associates of the Agricultural Experiment Station, East Lansing, Michigan. Onion bulbs, garlic, rhubarb and other plants were finely pulverized in a Waring blender usually with the addition of an equal volume of distilled water. The dilute paste thus formed was filtered through cotton cloth and the resulting turbid filtrate passed through a Seitz filter for sterilization. Serial dilutions of the final clear filtrates were made in tryptose broth, 5 cc. samples of each dilution being inoculated with E. cloi, S. aureus or B. abortus. After incubation the presence or absence of turbidity was taken as an index of bacteriostatic activity. Bactericidal activity was demonstrated by negative sub-culture.

Huddleson found that aqueous filtrates from many species of onions or garlic would inhibit growth of all three test organisms in dilutions as high as 1:160. The antibiotics in these filtrates can be heated to 60°C. for one hour without loss of bactericidal properties. The filtrates are inactivated, however, by heating to 100°C. for five minutes.

The active principle can be extracted from these filtrates by shaking them with chloroform. An impure, gum-like substance is obtained by evaporating the chloroform (partial vacuum). The active principle can be extracted from this initial product by its solubility in alcohol, the alcohol-insoluble fraction being inert. On evaporating the alcohol 150 mg of a semi-purified antibiotic is obtained from one pound of onion bulbs, and approximately 500 mg per pound from garlic.

The product thus obtained has many of the properties of penicillin. It inhibits the growth of Staphylococcus aureus and other gram-positive organisms in dilutions often as high as 1:600,000. It is relatively inactive against E. coli and other gram-negative bacteria. (The volatile E. coli inhibiting phytoncide of the Soviet bacteriologists is presumably lost during the process of isolation. The non-volatile quasi-penicillin is stable in water adjusted to pH 7.3, but slowly deteriorates in the presence of acid (pH above 7.5). The substance is not an aldehyde nor a carbohydrate, its chemical nature otherwise being undetermined. Adequately controlled toxicity and therapeutic tests on experimental animals have not yet been reported.

Huddleson is of the opinion that the main practical value of non-volatile antibiotics of this type may not lie in their use as therapeutic agents, but as preventives of gastro-intestinal infections. "Future studies may assign an importance to their value in the prevention of bacterial and parasitic infections as far reaching as that now assigned to vitamins of plant origin in the prevention of deficiency diseases." He cites no clinical or statistical evidence, however, in support of this belief, and fails to emphasize the fact that the penicillin-like substances in higher plants are rapidly destroyed by cooking, and presumably would be destroyed by the acidity of gastric juice.

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Walcher's Position

This was described by Gustav Adolph Walcher (b. 1856) of Stuttgart in a brief article entitled "Die Conjugata eines engen Beckens ist keine konstante Grösse, sondern lässt sich durch die Körperhaltung der Trägerin verändern [The Conjugate of a Contracted Pelvis Is Not a Fixed Measurement, but Varies with the Position of the Woman's Body]," in *Centralblatt für Gynäkologie* (13:892, 1889). A portion of the translation follows:

"If a woman well advanced in pregnancy (my observations were made almost entirely in such) whose pelvis is contracted in the conjugate diameter, be placed on the examining table with the upper part of the body moderately elevated and the knees held as close as possible to the body, the promontory is most easily reached: the diagonal conjugate measures, for example:

F. (26-year-old para I) 10.2 cm.
B. 40-year-old para II) 10.3 cm.
S. (36-year-old para IV) 10.2 cm.

"If a pillow is placed under the sacrum and the legs are allowed to hang down over the end of the table as far as possible, the promontory may be felt to recede with the lowering of the knees. The diagonal conjugate now measures:

F. 11.1 cm. (a difference of 9 mm.)
B. 11.6 cm. (a difference of 13 mm.)
S. 11.0 cm. (a difference of 8 mm.)"

—R. W. B., in *New England Journal of Medicine.*

There is here a great melting pot in which we must compound a precious metal. That metal is the metal of nationality.

—Woodrow Wilson, *Address*, Washington, 19 April, 1915.